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FORM PTO-1390 (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	
WATK:204	
U.S. APPLICATION NO (If known, see 37 CFR 1.5)	09/701430

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/JP00/03420	29 May 2000	31 May 1999

TITLE OF INVENTION: CANNING STRUCTURE AND METHOD FOR PRODUCING CATALYTIC CONVERTER USING THE CANNING STRUCTURE

APPLICANT(S) FOR DO/EO/US: Toshio YAMADA and Toshuihiko HIJIKATA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [X] This express request to begin national examination procedures (35 U.S.C. 371(f) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [ ] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [ ] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [X] has been transmitted by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [X] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
   b. [ ] have been transmitted by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [ ] have not been made and will not be made.
8. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [X] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern document(s) or information included:

11. [X] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [ ] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [X] A FIRST preliminary amendment.
    [ ] A SECOND or SUBSEQUENT preliminary amendment.
14. [ ] A substitute specification.
15. [ ] A change of power of attorney and/or address letter.
16. [X] Other items or information:
    a. Copy of PCT Application (Request)
    b. Copy of International Search Report and cited references

PLEASE ACCEPT THIS AS AUTHORIZATION TO DEBIT OR CREDIT FEES TO DEP. ACCT. 16-0331 PARKHURST & WENDEL

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U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
09/701430	PCT/JP00/03420	WATK-204

17. [X] The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

	CALCULATIONS PTO USE ONLY
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1,000.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $860.00	
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$760.00**	
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) $690.00	
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00
Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	7 - 20 =	-	X $18.00	$ -
Independent claims	2 - 3 =	-	X $80.00	$ -
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $270.00	$

TOTAL OF ABOVE CALCULATIONS =	$860.00
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also by filed (Note 37 CFR 1.9, 1.27, 1.28).	$ -
SUBTOTAL =	$860.00
Processing fee of **$130.00** for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +	$
TOTAL NATIONAL FEE =	$860.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +	$
TOTAL FEES ENCLOSED =	$860.00
Amount to be: refunded	$
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a. [X] A check in the amount of $860.00 to cover the above fees is enclosed.

b. [ ] Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 16-0331. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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Charles A. Wendel
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24,453
REGISTRATION NUMBER

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Toshio YAMADA et al.

Group Art Unit:

Serial No.: PCT/JP00/03420

Filed: November 29, 2000 Examiner:

For: CANNING STRUCTURE AND METHOD FOR PRODUCING CATALYTIC CONVERTER USING THE CANNING STRUCTURE

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-identified application, please enter the following claim changes as noted below:

IN THE CLAIMS:

Claim 4, line 1, delete "any one of claims 1 - 3" and insert --claim 1--.

Claim 5, line 1, delete "any one of claims 1 - 3" and insert --claim 1--.

Claim 6, line 1, delete "any one of claims 1 - 5" and insert --claim 1--.

REMARKS

This Preliminary Amendment is submitted to eliminate multiply dependent claims from the above-identified application.

Claims 1 to 7 are pending herein.

Prompt and favorable examination of this application on the merits is respectfully solicited.

Respectfully submitted,

PARKHURST & WENDEL, L.L.P.

November 29, 2000
Date

Charles A. Wendel
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CAW/ch
Attorney Docket No. WATK:204

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(rev. 3/3/00)

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09/701430
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DESCRIPTION

Canning Structure and Method for Producing Catalytic Converter Using the Canning Structure

Technical Field

The present invention relates to a canning structure for a catalytic converter which is a device for purifying harmful combustion gasses exhausted from internal combustion engines and the like. In more detail, the present invention relates to a canning structure in which a ceramic honeycomb structure before carrying a catalyst is fixed in a metal case by a holding member and a method for producing a ceramic catalytic converter using the canning structure.

Background Art

Currently, ceramic honeycomb catalytic converters are widely used as automobile exhaust gas purifying devices.

Environmental issues in recent years along with even stricter exhaust gas restrictions are requiring that catalysts be able to function immediately following starting the engine when the exhaust gas is still cool, i.e., cold starts.

Accordingly, a ceramic honeycomb structure having a

peripheral cell wall having a thickness of generally 0.1 mm or more, and more specifically 0.16 mm or more, has been used in a conventional catalyst carrier. Recently, a ceramic honeycomb structure having a cell wall having 1/2 – 1/6 of a thickness of a conventional one has been used so as to lower the thermal capacity of a ceramic honeycomb structure, which is a catalyst carrier and speed up the temperature rising of the catalyst carrier, along with avoiding deterioration in engine performance due to pressure loss.

Normally, a ceramic honeycomb catalytic converter using a ceramic honeycomb structure as a catalyst carrier is manufactured through the steps shown in Fig. 5.

For example, in the case that a ceramic honeycomb catalytic converter is produced by cooperation of a plurality of makers having different functions, first, the carrier manufacturer producing a ceramic honeycomb structure, which is a carrier, packages a ceramic carrier 10, i.e., ceramic honeycomb structure which has passed inspection and sends it to a catalyst manufacturer.

The catalyst manufacturer unpacks this, performs processes such as coating the ceramic carrier 10 with a desired catalyst, thermal processing, inspection, etc., thereby forming a catalyst carrier 25, i.e., ceramic honeycomb catalyst carrier, which is then packaged and sent to a canning manufacturer.

The canning manufacture unpacks this and attaches a

holding member 13 to the catalyst carrier 25 so as to fix within a metal case 11 by compressed fixing, i.e., canning, thus forming a canning catalyst carrier 30, following which joining parts such as a cone portion 17 and flange 18 and the like are welded to the canning catalyst carrier 30 as necessary, thus completing a catalytic converter as shown in, for example, Fig. 4, i.e., ceramic honeycomb catalytic converter.

However, in the event that a ceramic honeycomb structure having the thickness of the partitions at around 1/2 to 1/6 of the conventional thickness is used as the above catalyst carrier, there has been the problem that the ceramic honeycomb structure easily cracks or chips during transporting, the catalyst carrying process, the canning process, and handling in each of the processes, e.g., packaging, unpacking, placing on or taking off of the mechanical facilities such as conveyers, chucking, and canning.

For example, there arose a problem that incidence of cracks or chips in a ceramic honeycomb structure in all of the aforementioned production processes drastically increases up to 20-odd % when a ceramic honeycomb structure having a thickness of cell walls of 0.06 mm and 140 throughholes / cm^2 , which cell wall has a thickness of about 1/2 – 1/6 of that of a conventional one, is employed; while incidence of cracks or chips in a ceramic honeycomb structure in all of the aforementioned production processes is 1% or less when a

conventional representative ceramic honeycomb structure having a thickness of cell walls of 0.17 mm and 62 throughholes / cm^2 is employed.

In order to solve this problem, thickness of a peripheral portion or a peripheral portion and cell walls near the peripheral portion of the ceramic honeycomb structure, that is, the outermost wall of the honeycomb carrier or cell walls in contact with or near the outermost wall is selectively thickened at present. However, by employing such a constitution, not only thermal shock resistance of the ceramic honeycomb structure is decreased a great deal, but also walls in a cell portion in contact with the thickened cell walls are deformed, and thereby isostatic strength of the ceramic honeycomb structure is sharply decreased.

Disclosure of Invention

The present invention has been made in light of the present situation, and accordingly, it is an object thereof to provide a canning structure capable of preventing chipping and cracking of the ceramic honeycomb structure at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes, without decreasing properties of the ceramic honeycomb structure.

That is, according to the present invention, there is

provided a canning structure comprising:

a ceramic honeycomb structure before carrying a catalyst,

a metal case, and

a holding member;

the ceramic honeycomb structure being held in the metal case;

wherein the ceramic honeycomb structure is fixed beforehand within the metal case by the holding member.

Particularly, there is provided a canning structure according to claim 1, wherein the ceramic honeycomb structure has cell walls thinner than 0.10 mm; and more preferably a canning structure according to claim 1, wherein the ceramic honeycomb structure has cell walls thinner than 0.08 mm.

There is further provided a canning structure, wherein the holding member is a non-intumescent ceramic fiber mat.

There is furthermore provided a method for producing a ceramic catalytic converter using the above canning structure.

Brief Description of Drawings

Figs. 1(a), 1(b) and 1(c) show an embodiment of a canning structure of the present invention. Fig. 1(a) is a front view, Fgi. 1(b) is a side view, and Fig. 1(c) is a transverse sectional view.

Figs. 2(a), 2(b) and 2(c) show another embodiment of a canning structure of the present invention. Fig. 2(a) is a front view, Fig. 2(b) is a side view, and Fig. 2(c) is a transverse sectional view.

Fig. 3 is a schematic view showing a production process of a ceramic honeycomb catalytic converter using a canning structure of the present invention.

Fig. 4 is a schematic explanatory view showing an embodiment of a ceramic honeycomb catalytic converter.

Fig. 5 is a schematic view showing a production process of a conventional ceramic honeycomb catalytic converter.

Best Mode for Carrying Out the Invention

A canning structure as the first aspect of the present invention is formed by previously fixing a ceramic honeycomb structure before carrying a catalyst in a metal case by a holding member. By this, chipping and cracking of the ceramic honeycomb structure having a thin thickness of the partitions at around 1/2 to 1/6 of the conventional thickness is prevented at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes, without decreasing properties of the ceramic honeycomb structure.

Further, according to a method for producing a ceramic honeycomb catalytic converter using the above canning

structure as the second aspect of the present invention, a ceramic honeycomb catalytic converter can be produced with preventing chipping and cracking of the ceramic honeycomb structure having a thickness of the partitions at around 1/2 to 1/6 of the conventional thickness at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes, without decreasing properties of the ceramic honeycomb structure.

The present invention is hereinbelow described in more detail on the basis of the drawings.

Figs. 1(a) – 1(c) and 2(a) – 2(c) are explanatory views showing an example of a canning structure of the present invention.

As shown in Figs. 1(a) – 1(c) and 2(a) – 2(c), a canning structure of the present invention is prepared by fixing a ceramic honeycomb structure 10 having a thickness of the partitions at around 1/2 to 1/6 of the conventional thickness beforehand in a metal case 11 by a holding member 13.

By this, the canning structure 20 of the present invention can protect the ceramic honeycomb structure 10 from shocks or vibrations from outside. Therefore, chipping and cracking of the ceramic honeycomb structure 10, particularly a ceramic honeycomb structure having a thickness of cell walls of less than 0.10 mm, particularly 0.08 mm or less, can be prevented at the time of transporting, the catalyst carrying process, the

canning process, and handling in each of the processes, without decreasing properties of the ceramic honeycomb structure.

Further, a canning structure of the present invention is not required to thicken a thick peripheral portion or the peripheral portion and cell walls near the periphery of the ceramic honeycomb structure, i.e., the outermost wall of the honeycomb carrier and cell walls in contact with the outermost wall and cell walls located near the former cell walls, there arises no problem of deterioration in thermal shock resistance or isostatic strength of the ceramic honeycomb structure when it is mounted.

The canning structure 20 of the present invention preferably has a metal case having a stuffing structure as shown in Figs. 1(a) – 1(c) or a tourniquet structure as shown in Figs. 2(a) – 2(c).

This is because the plane pressure distribution at the time of canning is uniform, which allows prevention of engine exhaust gasses leaking, erosion of the holding material due to the exhaust gasses, and rattling, damage, etc., of the ceramic honeycomb structure due to engine vibrations, thereby improving reliability.

Particularly, in the event that the metal case has a tourniquet structure wherein both end portions 14a and 14b of the case are connected by welding or the like as shown in Figs. 1(a) – 1(c), not only is the plane pressure distribution uniform,

but also canning can be performed at a constant plane pressure without being influenced by irregularities in the diameter of the ceramic honeycomb structure, which is particularly preferable for ceramic honeycomb structures having thin cell walls with low mechanical strength used in the present invention.

Also, the holding member 13 used in the present invention is preferably a non-intumescent ceramic fiber mat.

This allows the maximum plane pressure at the time of caning due to irregularities in the diameter of the ceramic honeycomb structure to be reduced, and an excessive pressure is not generated at the time of heating as with expanding mats. Therefore, a ceramic honeycomb structure having a thickness of cell walls at around 1/2 to 1/6 of the conventional thickness, i.e., cell walls having a thickness of below 0.1 mm, more specifically, a thickness of 0.08 mm – 0.02 mm can be prevented from being damaged.

Now, the non-intumescent ceramic fiber mat used with the present invention is made up of at least one selected from the following group; alumina, mullite, silicon carbide, silicon nitride, and zircon. This non-intumescent ceramic fiber mat is formed of ceramic fibers wherein the fiber diameter is 2 μm or more and less than 6 μm, such that application of an initial plane pressure of 2 kgf/cm^2 at room temperature and then raising the temperature to 1,000℃ results in generation of a

plane pressure of at least 1 kgf/cm^2, and also has the compression properties in that there is little increase or decrease within the actual usage temperature range of the catalytic converter 1.

The partition thickness of the ceramic honeycomb structure used in the present invention is preferably below 0.10 mm, and more preferably, 0.08 mm – 0.02 mm.

This is because by decreasing a thickness of cell walls in such a manner, function of catalyst at cold starts can be exhibited in a short time by lowering the thermal capacity of the catalyst carrier and speeding up the temperature rising of the catalyst carrier, along with avoiding deterioration in engine performance due to pressure loss.

Next, a scheme of a manufacturing processing for the ceramic honeycomb catalytic converter using the canning structure according to the present invention will be described with reference to Fig. 3.

In the case that a catalytic converter is produced by a division of labor system, first , the carrier manufacture provides a holding member 13 to a ceramic carrier 10 which has passed inspection and compresses and fixes the ceramic carrier 10 within a metal case 11 for canning, thereby forming a canning structure 20, which is then packaged and sent to a catalyst manufacturer.

The catalyst manufacturer unpacks this, performs the

processes such as causing the canning structure 20 to carry the catalyst, thermal processing, inspection, etc., thereby forming a canning catalyst carrier, which is then packaged and sent to a canning manufacturer.

The canning manufacturer unpacks this and welds joining parts such as a cone portion 17 and flange 18 and the like to the canning catalyst carrier 30, thereby completing the ceramic honeycomb catalytic converter as schematically shown in Fig. 4, i.e., a catalytic converter 1.

It is a matter of course that all these steps may be performed in the same factory or the same company.

As described above, method for manufacturing the ceramic honeycomb catalytic converter according to the present invention is capable of protecting the ceramic honeycomb structure 10 from external shock and vibrations as compared with conventional manufacturing methods shown in Fig. 5, and accordingly chipping and cracking of ceramic honeycomb structures 10 can be markedly prevented at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes.

Next, the present invention will be described in further detail with reference to embodiments. However, it should be noted that the present invention is by no means restricted to these embodiments.

[Embodiment 1]

A cordierite ceramic carrier 10 with a diameter of 106 mm, length of 114 mm, thickness of peripheral wall of 0.03 mm, and 140 throughholes / cm^2, was prepared, and a non-intumescent ceramic fiber mat ("MAFTEC"(product name), manufactured by MITSUBISHI CHEMICAL CORPORATION) of 1,200 g per 1 m^2 was wrapped thereupon, as a holding member 13.

The ceramic honeycomb structure 10 upon which the holding member 13 had been wrapped was pressed into a stainless-steel can 11 with an inner diameter of 114 mm, length of 124 mm, and thickness of 1.5 mm, using a tapered jig for pressing, thereby manufacturing the canning structure 20 shown in Figs. 1(a) – 1(c).

[Embodiments 2 – 3]

There were prepared a cordierite ceramic carrier with a diameter of 106 mm, length of 114 mm, thickness of cell walls of 0.04 mm, and 280 throughholes / cm^2 as a ceramic honeycomb structure 10 in Embodiment 2, and a cordierite ceramic carrier with a diameter of 106 mm, length of 114 mm, thickness of cell walls of 0.025 mm, and 465 throughholes / cm^2. A stainless-steel can 11 with an inner diameter of about 123 mm, length of 124 mm, and thickness of 1.5 mm was subjected to winding-tightening at a constant load upon the ceramic honeycomb structure 10 upon which the holding member 13 had been wrapped to give a design plane pressure of 2 kgf/cm^2 and

the end of the metal case was welded extending over the full length to obtain a canning structure 20 as shown in Figs 2(a) – 2(c).

Next, twenty of such canning structures in each embodiment (60 in total) were placed in the manufacturing process of a ceramic honeycomb catalytic converter 1 shown in Fig. 3.

Consequently, no cracking or chipping of the ceramic honeycomb structure was observed at any point in the above manufacturing process.

[Comparative Example]

Twenty cordierite ceramic carriers 10 with a diameter of 106 mm, length of 114 mm, thickness of cell walls of 0.06 mm, and 140 throughholes / cm^2 were produced by the ceramic honeycomb catalytic converter (stuffing canning) manufacturing process shown in Fig. 5.

Consequently, the rate of cracking or chipping of the ceramic honeycomb structures throughout the above manufacturing process reached 25%.

It was found that since Embodiments 1 – 3 can protect a ceramic honeycomb structure from shocks and vibrations from outside in comparison with Comparative Example, chipping and cracking of the ceramic honeycomb structure at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes can be sharply reduced.

Industrial Applicability

A canning structure of the present invention exhibits an effect of preventing chipping and cracking of the ceramic honeycomb structure at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes, without decreasing properties of the ceramic honeycomb structure. Consequently, it may be said that the canning structure of the present invention has high industrial applicability.

CLAIMS

1. A canning structure comprising:

a ceramic honeycomb structure before carrying a catalyst,

a metal case, and

a holding member;

the ceramic honeycomb structure being held in the metal case;

wherein the ceramic honeycomb structure is fixed beforehand within the metal case by the holding member.

2. A canning structure according to claim 1, wherein the ceramic honeycomb structure has cell walls thinner than 0.10 mm.

3. A canning structure according to claim 1, wherein the ceramic honeycomb structure has cell walls thinner than 0.08 mm.

4. A canning structure according to any one of claims 1 – 3, wherein the metal case has a stuffing structure.

5. A canning structure according to any one of claims 1 – 3, wherein the metal case has a tourniquet structure.

6. A canning structure according to any one of claims 1 – 5, wherein the holding member is a non-intumescent ceramic fiber mat.

7. A method for producing a ceramic catalytic converter comprising the steps of:

producing the ceramic honeycomb structure fixed beforehand within the metal case by the holding member by putting and fixing a ceramic honeycomb structure before carrying a catalyst in a metal case by means of a holding member,

loading the ceramic honeycomb structure with a catalyst, and

mounting a flange and a corn portion on the canning structure carrying the catalyst.

ABSTRACT

There is provided a canning structure capable of preventing chipping and cracking of the ceramic honeycomb structure at the time of transporting, the catalyst carrying process, the canning process, and handling in each of the processes, without decreasing properties of the ceramic honeycomb structure by previously fixing a ceramic honeycomb structure (10) before carrying a catalyst in a metal case (11) by a holding member (13).

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Declaration and Power of Attorney Under Patent Cooperation Treaty 35 USC §371(c)(4)

As a below named inventor, I hereby declare that:

my residence, post office address and citizenship are as stated below next to my name; that

I verily believe that I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural names are named below) of the invention entitled: CANNING STRUCTURE AND METHOD FOR PRODUCING CATALYTIC CONVERTER USING THE CANNING STRUCTURE described and claimed in the international application number PCT/JP00/03420 filed May 29, 2000 and as amended on _____ (if any), the specification and claims of which I have reviewed and understand and for which I solicit a patent.

I acknowledge my duty to disclose information of which I am aware which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a), and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to my international application by me or my legal representatives or assigns, except as follows:

Japanese Patent Application No.11-151836 filed on May 31, 1999.

The priority of the above applications (if any), filed within a year prior to my international application is hereby claimed under 35 USC 119. I hereby appoint the following as my attorneys of record with full power of substitution and revocation to prosecute this application and to transact all business in the patent office:

Roger W. Parkhurst, Reg. No. 25,177; Charles A. Wendel, Reg. No. 24,453; Lawrence D. Eisen, Reg. No. 41,009.

ALL CORRESPONDENCE IN CONNECTION WITH THIS APPLICATION SHOULD BE SENT TO: PARKHURST & WENDEL, L.L.P., 1421 PRINCE STREET, SUITE 210, ALEXANDRIA, VIRGINIA 22314-2805, TELEPHONE (703) 739-0220.

I hereby declare that I have reviewed and understand the contents of this Declaration, and that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

3. Full Name of Sole or First Inventor: Toshio (Given Name) ~~YAMADA~~ (Family Name)

*4. Inventor's Signature: Toshio Yamada

Date of Signature: November (Month) 17th (Day) 2000 (Year)

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*IF THERE IS MORE THAN ONE INVENTOR USE PAGE 2 AND PLACE AN "X" HERE ☒.

PAGE 2 OF U.S.A. DECLARATION FORM
(Discard this page in a sole inventor application)

3 Typewritten Full Name of Second Joint Inventor (if any): Toshihiko (Given Name) | (Middle Initial) | HIJIKATA (Family Name)

*4 Inventor's Signature ☞ Toshihiko Hijikata

5 Date of Signature ☞ November (Month) 17th (Day) 2000 (Year)

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*4 Inventor's Signature ☞

5 Date of Signature ☞ (Month) (Day) (Year)

6 Residence: (City) (State or Province) (Country)

7 Citizenship:

8 Post Office Address (Insert complete mailing address, including country):

3 Typewritten Full Name of Fourth Joint Inventor (if any): (Given Name) | (Middle Initial) | (Family Name)

*4 Inventor's Signature ☞

5 Date of Signature ☞ (Month) (Day) (Year)

6 Residence: (City) (State or Province) (Country)

7 Citizenship:

8 Post Office Address (Insert complete mailing address, including country):

3 Typewritten Full Name of Fifth Joint Inventor (if any): (Given Name) | (Middle Initial) | (Family Name)

*4 Inventor's Signature ☞

5 Date of Signature ☞ (Month) (Day) (Year)

6 Residence: (City) (State or Province) (Country)

7 Citizenship:

8 Post Office Address (Insert complete mailing address, including country):

*Note to Inventors: Please sign name on line 4 exactly as it appears in line 3 and insert the actual date of signing *on line 5.*

**This form may be executed only when attached to the first page of the Declaration and Power of Attorney form and the specification (including claims) of the application to which it pertains.

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Office of Initial Patent Examination -- Scanning Division

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